

# A control method of Boost converter

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**Abstract**—In the scope of our investigation, we have solved the stability problem of the boost converter. Ouyang Changlian's doctoral dissertation made me realize the importance of duty cycle in control system. Finally, this article is written for patent CN117254710A.

***Index Terms***—Control design.

## I. INTRODUCTION

WE use a few special symbols, hoping to present the current instructions in a way that would be easier to understand.

$$i_{ref} = i_{ref} \uparrow + i_{ref} \downarrow \quad (1)$$

The above formula means that the current instruction gain in the inductor current down stage is different from the current instruction gain in the inductor current up stage.

At first, we tried to create a control method that naturally reflected the duty cycle, and put our hopes in the current loop.

Secondly, we may get the formulas below.

$$i_{ref} = k_{i0}(k_{i1}i_L + k_{i2}i_c + k_{i3}i_v) \quad (2)$$

$$i_{ref} = k_{i4}(2k_{i5}i_L - k_{i6}i_{MOS}) \quad (3)$$

Finally, we get the control block diagram.

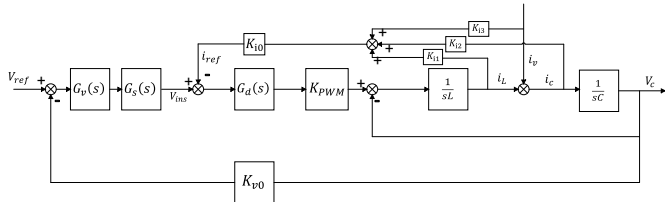


Fig. 1. Control topology.

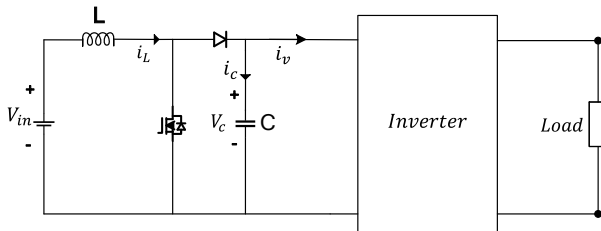


Fig. 2. Circuit topology.

## II. CONCLUSION

The control method works well.



Fig. 3. Full view of the waveform.

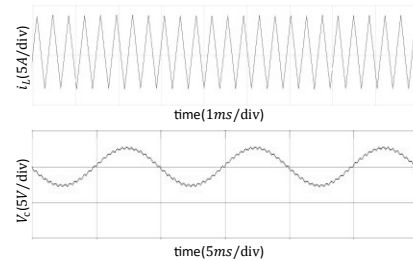


Fig. 4. Detail of Waveform.

From 200V boost to 400V, the power of inverter is 2kW.  $G_v(s)$  and  $G_d(s)$  are PID controllers.  $G_s(s)$  is a notch filter controller. When the system load is 50ms, it decreases from 100% load to 10% load, and increases from 10% load to 100% load at 250ms. When partial load is discarded, the bus voltage recovery time is only about 104ms, and the maximum bus voltage jitter is 10.87V. The system dynamic response characteristics are excellent. Additionally, the control method also works fine for buck.

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